ATTACHMENT 2

1987 ENGINEERING REPORT

HANSON ENGINEERS
INCORPORATED

July 2, 1987

City Water, Light and Power
V.Y. Dallman Power Plant
3100 Stevenson Drive
Springfield, Illinois 62703

Attn: Mr. Carl J. Saladino

Re: Engineering Report
Proposed Embankment Modifications
CWLP Ash Disposal Area
Springfield, Illinois

Dear Carl,

Enclosed are four copies of our Engineering Report for the proposed embankment modifications at your existing Lakeside ash disposal area.

Two copies of our report have been sent to the Illinois Department of Transportation, Division of Water Resources for conceptual approval of the permit application.

Please do not hesitate to call if you have any questions regarding this information.

Very truly yours,

HANSON ENGINEERS INCORPORATED

Danny L. Kerns

Danny L. Kerns, P.E.
Associate Partner

Enclosures

DLK/pb

HANSON ENGINEERS INCORPORATED

July 2, 1987

Mr. Martin Stralow, P.E.
Chief, Dam Safety Section
Illinois Department of Transportation
Division of Water Resources
2300 South Dirksen Parkway
Springfield, Illinois 62764

Re: Engineering Report
Proposed Embankment Modifications
CWLP Ash Disposal Area
Springfield, Illinois

Dear Mr. Stralow:

Enclosed for your review and comments are two copies of our Engineering Report for the proposed embankment modifications at the Lakeside ash disposal area in Springfield, Illinois. The report includes an application for a permit to perform the proposed modifications.

Upon receipt of conceptual approval for this project, we will prepare and submit construction drawings and specifications along with the other items required for the permitting process.

Please keep us advised of any concerns or comments which may arise during your review so that we can address them in a timely manner.

Very truly yours,

HANSON ENGINEERS INCORPORATED

Danny L. Kerns

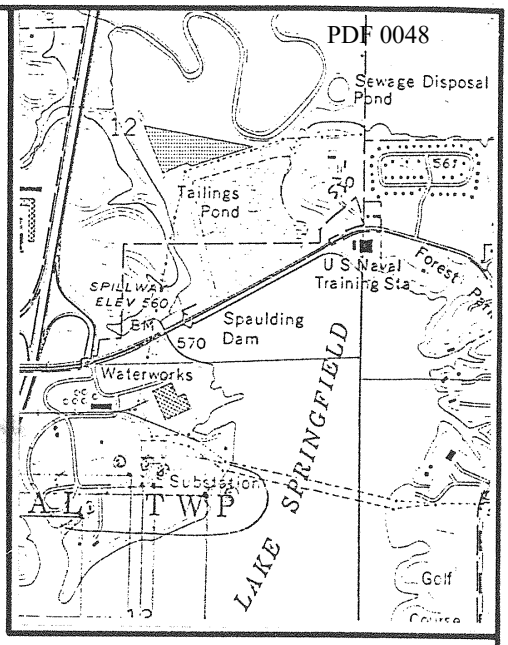
Danny L. Kerns, P.E.
Associate Partner

enclosures

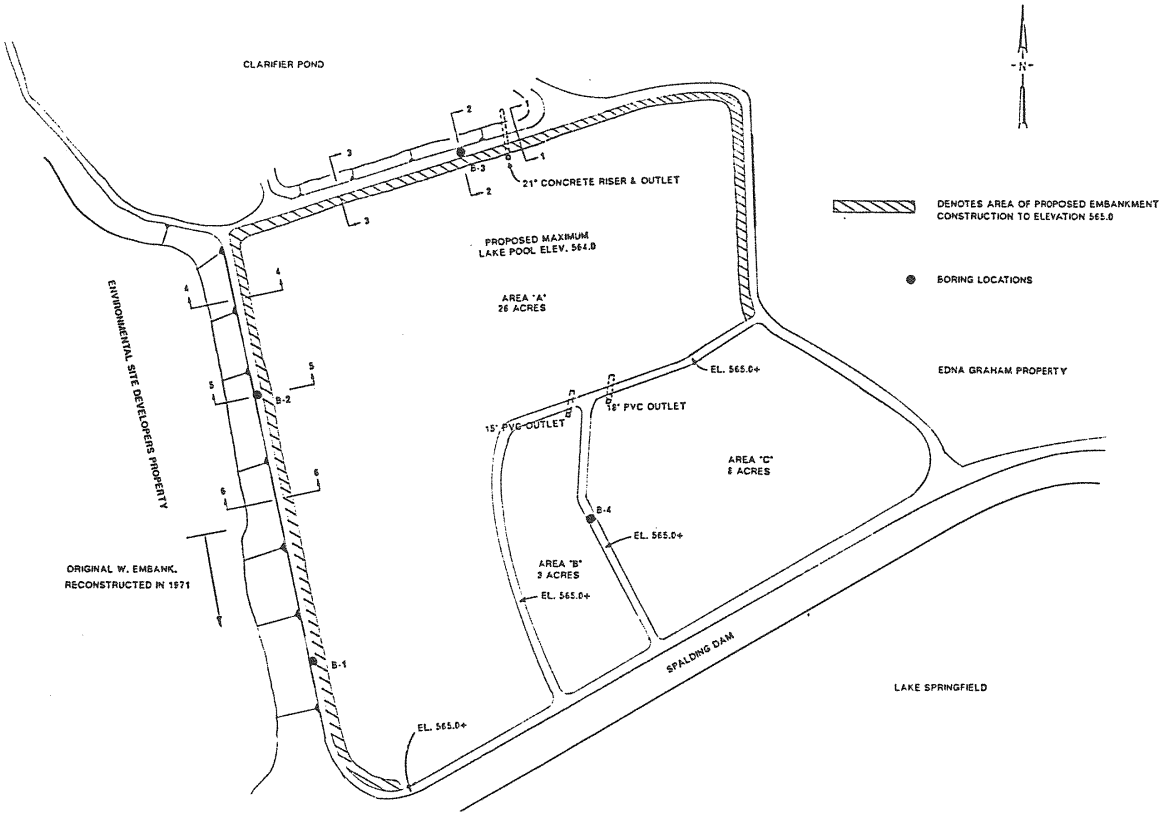
DLK/pb

CC: Mr. Carl J. Saladino
CWLP

PDF 0048



VICINITY MAP



LIST OF ADJACENT PROPERTY OWNERS

NO.	NAME	ADDRESS
1.	ENVIRONMENTAL SITE DEVELOPERS INC.	195 EAST LAKE DRIVE SPRINGFIELD, IL. 62703
2.	MRS. EDNA GRAHAM	
3.		
4.		

PROJECT DESCRIPTION:

RAISE PORTION OF LAKESIDE ASH DISPOSAL EMBANKMENT A MAXIMUM OF 10 FT.

LOCATION:

SPAULDING DAM
CITY OF SPRINGFIELD
SANGAMON COUNTY

SHEET OF

NCR FORM 427
01 JUNE 81

CORPS OF ENGINEERS COPY

JOINT APPLICATION FORM

PDF 0049

1. Application Number (To be assigned by Agency)

2. Date

Day Month Year

3. For Agency use only (Date Received)

4. Name and address of applicant

City of Springfield
City Water, Light and Power
3100 Stevenson Drive
Springfield, Illinois 62703

Telephone no. during business hours
A/C (217) 786-4063

A/C ( )

5. Name, address, and title of authorized agent

Hanson Engineers Incorporated
1525 South 6th Street
Springfield, Illinois 62703

Telephone no. during business hours
A/C (217) 788-2450

A/C ( )

6. Describe in detail the proposed activity, its purpose, and intended use. If additional space is needed, attach additional support information to each agency application.

Raise portion of existing Lakeside Ash Disposal Area embankment a maximum of 10 ft to obtain additional storage volume for ash and filter cake slude disposal.

7. Names, addresses, and telephone numbers of all adjoining and potentially affected property owners, including the owner of subject property if different from applicant.

Environmental Site Developers, Inc., 195 East Lake Drive, Springfield, IL, 217-529-1891
Mrs. Edna Graham

8. Location of activity
Address:

City Water, Light and Power - Spaulding Dam
Street, road, or other descriptive location

Springfield
In or near city or town

Sangamon (County) Illinois (State) 62703 (Zip Code)

Legal Description:

SE (¼) 12 (Sec.) T15N (Twp.) R5W (Rge.) 3rd (P.M.)

Tax Assessor's Description (if known):

Map No. Subdiv. No. Lot No.

Name of waterway at location of the activity

9. Date activity is proposed to commence September, 1987 Date activity is expected to be completed June, 1988

10. Is any portion of the activity for which authorization is sought now complete? ___ Yes X No If answer is "Yes" give reasons in the remark section. Month and Year the activity was completed - Indicate the existing work on drawings.

11. List all approvals or certifications required by other federal, interstate, state, or local agencies for any structures, construction, discharges, deposits, or other activities described in this application. If this form is being used for concurrent application to the Corps of Engineers, Illinois Department of Transportation, and Illinois Environmental Protection Agency, these agencies need not be listed.

Issuing Agency	Type Approval	Identification No.	Date of Application	Date of Approval
-	-	-	-	-

12. Has any agency denied approval for the activity described herein or for any activity directly related to the activity described herein.
___ Yes X No (If "Yes", explain in remarks.)

13. Remarks

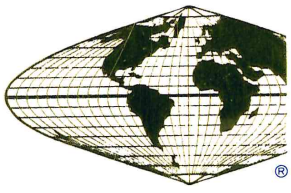
14. Application is hereby made for authorizations of the activities described herein. I certify that I am familiar with the information contained in the application, and that to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities.

Signature of Applicant or Authorized Agent

NCR FORM 426
01 JUNE 81

CORPS OF ENGINEERS COPY - SEE JURISDICTIONAL MAP FOR ADDRESS

ENGINEERING REPORT
PROPOSED EMBANKMENT MODIFICATIONS
CWLP ASH DISPOSAL AREA
SPRINGFIELD, ILLINOIS



HANSON ENGINEERS
INCORPORATED

ENGINEERING REPORT
PROPOSED EMBANKMENT MODIFICATIONS
CWLP ASH DISPOSAL AREA
SPRINGFIELD, ILLINOIS

Prepared By

Hanson Engineers Incorporated
1525 South Sixth Street
Springfield, Illinois 62703-2886

Prepared For

City Water, Light and Power
3100 Stevenson Drive
Springfield, Illinois 62703

July 2, 1987

HANSON ENGINEERS INCORPORATED

July 2, 1987

City Water, Light and Power
V.Y. Dallman Power Plant
3100 Stevenson Drive
Springfield, Illinois 62703

Attn: Mr. Carl J. Saladino

Re: Engineering Report
Proposed Embankment Modifications
CWLP Ash Disposal Area
Springfield, Illinois

Gentlemen:

Following is our Engineering Report for the proposed embankment modifications at your existing ash disposal area in Springfield, Illinois. This work was completed in accordance with our agreement for engineering services dated April 2, 1987.

Boring samples will be retained in our laboratory and disposed of after a minimum of 90 days. Please notify our office if you wish alternative disposition of the samples.

We are pleased to have had the opportunity to perform this work. If you have any questions concerning the report, or if Hanson Engineers may be of additional service to you on this project, please do not hesitate to call.

Very truly yours,

HANSON ENGINEERS INCORPORATED

Danny L. Kerns

Danny L. Kerns, P.E.
Associate Partner

Approved by John M. Healy
John M. Healy, P.E., S.E.
Vice President

- C O N T E N T S -

INTRODUCTION

This report presents the results of our investigation of the existing ash disposal area embankment and our analyses of the proposed modifications to the embankment. The purpose of this investigation was to develop specific recommendations relative to the proposed modifications and to secure field information which will be of aid during construction.

The conclusions and recommendations presented within this report have been developed directly from: (1) the results of four test borings made at the site by Central Illinois Drilling Company, (2) the results of laboratory testing on samples obtained from these borings, (3) our site inspection of existing embankment conditions, and (4) analyses of existing and proposed conditions. This report has been prepared for the exclusive use of City Water, Light and Power for specific application to this project in accordance with generally accepted engineering practices. No other warranty, expressed or implied, is made.

The locations of the borings on the site were laid out in the field by Hanson Engineers relative to existing site features with the use of a cloth tape. Elevations of the ground surface at the boring locations were determined with a level instrument utilizing the crest of the disposal area outlet pipe at elevation 554.1 as a reference datum. The locations and elevations of the borings have been determined with sufficient accuracy for the intentions of the subsurface investigation but should not be referenced for other purposes. The boring locations relative to the proposed construction are shown in Figure 2.

Detailed field logs have been prepared by the drilling foreman which record the changes encountered in the subsurface strata and summarize the field sampling completed. No attempts have been made by Hanson Engineers to

modify the subsurface descriptions on these logs to conform with later classifications made in the laboratory. It is emphasized that the recommendations contained within this report are based upon the laboratory classifications of samples. A copy of the driller's field logs is contained within Appendix A of this report.

Figures 3 and 4 are Laboratory Soil Test Data sheets which contain a completed tabulation of all visual classifications and routine tests completed by Hanson Engineers for this project. A description of procedures for the routine testing is presented within a later section of this report.

HISTORY OF ASH DISPOSAL AREA

The initial deposition of fly ash was started in the original disposal area north of Spaulding Dam shortly after completion of the first power plant sometime in the middle 1930's. This original disposal area encompassed Areas B and C shown in Figure 1, as well as the south half of Area A. The south portion of the west embankment was part of the construction for the original ash disposal area.

In 1966, plans were prepared for expanding the disposal area to the north. The north embankment and the north portion of the west embankment were constructed in conjunction with this expansion. Slopes of 2.0H to 1.0V are indicated on the construction drawings, as is a crest width of 12 ft. "Compact to 90% Maximum Density at Optimum Moisture" is noted on these 1966 drawings.

A breach occurred in the south portion (original) of the west embankment in 1970. Reconstruction of the entire original west embankment included a sand drain which was placed horizontally along the embankment toe and up the embankment slope. A buttress of compacted clay (capped on its lower portion with riprap) was placed over the sand drain. The reconstructed downstream face had a slope of 3.0H to 1.0V, with a berm formed at approximately mid-slope at the top of the riprap.

Sometime between 1971 and 1976, a clarifier pond was constructed immediately north of the ash disposal area. In 1976, construction drawings were prepared for a new ash disposal area for Dallman Power Plant. These construction drawings also include drawings for modifications to the north portion of the west embankment of the existing ash disposal area. These modifications include a sloped granular drainage blanket connected to an 8 in. diameter perforated pipe running the length of the embankment. Compacted

material downstream of this drainage blanket flattened the downstream slope to 2.5 H to 1.0V. The outlet of the drainage pipe is indicated to be north of the original west embankment (which had been reconstructed in 1971).

North-south cross dikes were constructed over ponded ash material in the original disposal area subsequent to 1976. In addition, a portion of the north embankment of the original ash disposal area was raised in height. This construction formed Areas B and C to their present configurations.

PROPOSED MODIFICATIONS

In order to increase the storage capacity and useful life of the existing ash disposal area, it is proposed that the perimeter embankment of Area A be raised to elevation 565. This would effectively raise the existing embankment up to 10 ft in height and bring the Area A perimeter embankment crest to the approximate elevation of the embankments surrounding Areas B and C. The proposed modifications will involve raising approximately 3,200 lineal feet of embankment, primarily along the west and north sides of Area A.

The upstream method of construction is proposed for the embankment modifications. This method was selected for two reasons. First, it allows for the continued use of the existing embankment crest roadways during construction for haul trucks to and from the scrubber sludge and Dallman ash disposal areas to the north. These roadways can be maintained at their existing grades. Second, the upstream method of construction allows the existing embankment crest roadways to be used as a berm (width varies from approximately 14 ft to 24 ft) for the proposed final embankment section. This berm will serve to effectively reduce the overall outside slope of the embankment, thereby increasing the stability of the embankment section.

The proposed embankment modification will consist of a 10 ft wide crest with a 2.0H to 1.0V downstream side slope, a 1.0H to 1.0V upstream side slope, and a 10 ft maximum height as shown in Figure 2. In order to develop a stable base for construction equipment to place and compact the cohesive embankment material, it is proposed that bottom ash material be placed for a distance of up to approximately 45 ft upstream of the existing embankment crest. The bottom ash should displace the fly ash and filter cake sludge materials that are present upstream of the crest primarily along the north embankment and the northern portion of the west embankment.

In order to reduce the development of seepage pressures at the junction between the existing embankment and the proposed extension, we propose that a filter fabric wrapped perforated pipe be installed along this area. The pipe may be trenched in and surrounded with free draining material such as bottom ash. Non-perforated outlet pipes may be used to direct collected seepage into the clarifier pond.

A new drop inlet spillway pipe will be provided near the location of the existing pipe. This new pipe will pass through the proposed embankment and will pass through the crest and along the outside face of the existing embankment into the existing clarifier pond.

FIELD INVESTIGATION

The field investigation program for this project encompassed several items of work including: exploratory borings, sampling of the subsoils, field testing of the subsoils, and visual classifications by the boring foreman of the soil materials encountered. A site inspection was also conducted by representatives of Hanson Engineers to obtain information on present embankment conditions, spillway pipe sizes, and to develop cross sections at various locations along the embankment. In addition, 15 test pits were excavated with a backhoe to better characterize the nature of the materials directly upstream of the existing embankment crest.

The test borings were made with a truck mounted rig equipped with 8 in. diameter hollow stem augers to advance the hole. To permit proper laboratory identification and classification of the subsurface strata, representative samples of the subsoil were taken at regular intervals within each boring. Boring 1 was made in the southern portion of the west embankment. This is a portion of the original embankment for the disposal area and was reconstructed after a breach occurred in 1970. Borings 2 and 3 were made in the northern portion of the west embankment and the north embankment, respectively. These embankments were constructed as part of the disposal area expansion in 1966. Boring 4 was made in a cross dike which separates Areas B and C. This cross dike was constructed on ponded fly ash and bottom ash materials. The information obtained from Boring 4 was helpful in evaluating the effectiveness of the proposed upstream method of construction, where the proposed embankment will also be constructed on ponded fly ash and bottom ash materials.

Soil samples were recovered from the borings by driving a 2 in. O.D. (1 3/8 in. I.D.) split-barrel sampler in conformance with the requirements of ASTM Standard D 1586. The recovered samples were classified by the drilling

foreman, sealed in properly identified glass jars, and stored in boxes for later shipment to Hanson Engineers' laboratory.

The field testing consisted of recording the resistance of the various substrata to penetration of the split-barrel sampler in conformance with the requirements of ASTM Standard D 1586. The testing procedure consisted of dropping a 140 lb hammer from a height of 30 in. onto the drill rods guiding the sampler. The number of blows (N) necessary to produce a penetration of 1 ft was recorded as the penetration resistance. To avoid seating errors, the blows for the first 6 in. of penetration were not taken into account; those required to increase the penetration from 6 to 18 in. were recorded as the N-value.

The site inspection was performed on June 2, 1987. The west and north embankments were observed for seepage, erosion channels, undesirable vegetative growth, sloughs, and animal holes. In addition, cross sections at various locations along these embankments were developed. Fifteen test pits were excavated along the upstream crest of the north and west embankments. These test pits were spaced approximately 100 ft apart along the north embankment and approximately 200 ft apart along the west embankment. The results of the site inspection and test pit investigation are described in a subsequent section of this report.

LABORATORY INVESTIGATION

Field samples delivered to our laboratory were subjected to a program of routine laboratory testing which included: soil type classifications by visual methods as recommended in ASTM Standard D 2488, moisture content determination, according to ASTM Standard D 2216, and unconfined compressive strength measurements (of cohesive soil samples) in general conformance with ASTM Standard D 2166. The data obtained from these standard test methods are grouped by boring and recorded on the Laboratory Soil Test Data sheets (Figures 3 and 4).

The laboratory classification of soil samples consisted of assigning each sample (by visual methods) to one of three primary soil groups, and conducting a few simple manual tests for more refined identification when required. The three soil groups are: coarse-grained soils (more than half of the particles by weight are visible to the naked eye); fine-grained soils (more than half of the particles by weight are so fine that they cannot be seen with the naked eye); and organic soils (those which obtain significant quantities of organic matter). The fine-grained soil fractions are subdivided into silt and clay based on visual appearance and simple manual tests which may include dry strength, dilatancy, and plastic thread. The coarse-grained soils are identified as boulders, cobbles, gravel, or sand, based on a visual evaluation of the size of the particles making up the sample, and estimates are made on the percentage of fines present. The presence of organic matter is based upon color, odor, and visual appearance.

In the unconfined compressive strength test, a cylinder of soil having a height of 1 1/2 to 2 times the average diameter is loaded to failure, in simple compression, quickly enough that the water content of the soil does not change. The failure load (or if the sample does not fail outright, the load required to produce 20 percent strain) is expressed as the load per unit of

cross sectional area, in tons per square foot. A calibrated penetrometer was also employed to provide supplemental data on consistency or to test samples unsuitable for unconfined compressive strength testing. However, the values from the penetrometer tests are considered only as approximate indicators of consistency.

The results of the unconfined compression tests on the split-barrel samples are subject to interpretation considering the disturbance inherent to the sampling procedure that is used. Generally, shear strength determinations on split-barrel samples are considered slightly to moderately conservative depending upon the sensitivity of the subsoil strata being investigated.

EXISTING EMBANKMENT CONDITIONS

The perimeter embankment of the ash disposal area consists of several distinct sections which distinguish themselves by their configuration, history of construction, or other factors. The following paragraphs describe these various embankment sections as they relate to existing conditions and the proposed construction.

The south portion of the west embankment appeared to be in very good condition. While the downstream embankment slope is relatively flat (approximately 3.0H to 1.0V), trees and brush have been allowed to grow along this portion of the embankment. Numerous swampy, wet areas are present beyond the embankment toe. These are proably the result of drainage from the sand filter and drain which was incorporated into the 1971 reconstruction of this portion of the embankment. No signs of distress were observed along the crest or downstream slope in this area. Located along the west embankment crest are two pipes which carry ash as a slurry from Dallman Power Plant to the ash disposal area located across the clarifier pond to the north. Bottom ash is generally present upstream of this portion of the embankment.

A concentrated seep was observed at the toe of the embankment near the north end of the 1971 reconstruction. Flows from this seep were clear and were estimated to be approximately 2 to 4 gallons per minute. The location of this discharge corresponds to an 8 in. diameter toe drain outlet pipe indicated on construction drawings prepared in 1976. These drawings show a rehabilitation of the northern portion of the west embankment, incorporating a granular filter drain collecting seepage water into an 8 in. diameter perforated subdrain passing along the embankment toe to the outlet location. Compacted embankment material is shown over the granular filter drain. The rehabilitation flattened the downstream slope to 2.5H to 1.0V from 2.0H to 1.0V.

The northern portion of the west embankment also appeared to be in generally good condition. Downstream slopes were measured to be approximately 2.5H to 1.0V or flatter, and the crest width varied from 22 ft to 24 ft. The ponded materials upstream of the crest become increasingly fine to the north end of this embankment. No tension cracks or other indications of distress were noted on the embankment crest.

An erosional channel (approximately 2 ft wide and up to 1 ft deep) was noted on the downstream slope of this embankment. This channel did not appear to be active. A minor surface slide was observed on the downstream face in an area in which a break in the ash line had occurred previously. Ash was present at the toe of the embankment in this area as though it had washed down the slope. A small scarp is located near the top of the embankment in this slide area, and some embankment material is piled near the bottom of the slide area, which is located about two-thirds down the slope.

At the far north end of the west embankment, the downstream toe area is very flat and swampy, with cattail growth. This swampy area follows the toe of the west embankment around to the toe of the south embankment of the adjacent clarifier pond. No concentrated seeps were noted. However, the seepage from this area is collected in a shallow ditch which runs to nearby Sugar Creek. Flows in this ditch were estimated to be approximately 2 to 3 gallons per minute. Scattered small tree and brush growth was observed along this portion of the embankment.

The north embankment is considerably more steep than the west embankment. Measurements indicate that the downstream embankment face exists at a slope ranging from 1.0H to 1.0V to 1.3H to 1.0V. The crest width is about 14 ft, and no signs of distress were observed. Fairly heavy tree and brush growth exists along the downstream slope. A clarifier pond abuts the north embankment toe along a major portion of its length. The water level in

this clarifier pond is only about 7 ft or 8 ft below the water level in the ash disposal area.

Test pits along the upstream edge of the north embankment encountered fly ash in the western portion and filter cake sludge in the eastern portion. These materials are both very fine, wet, and very soft. Cattail growth is fairly heavy along the areas where fly ash is present.

As a part of our site inspection, Illinois Department of Transportation, Division of Water Resources, Dam Inspection Forms were completed. Appendix B of this report contains these completed forms.

SLOPE STABILITY

Cross sections through the north and west embankments indicating existing and proposed conditions are presented in Figures 5, 6, and 7. Two of these cross sections were taken at the locations of Borings 2 and 3. The unconfined compressive strengths (Qu) and the Standard Penetration Test N-values from these borings are plotted on these cross sections. Also indicated are the generalized subsurface profiles at the boring locations. Similar test data and subsurface profile information are presented on Figure 8 for Borings 1 and 4.

Using this cross section information and the laboratory test data for samples obtained from the borings, slope stability analyses were performed for the north and west embankments. These analyses used slope stability charts originally published by Taylor (1937), and presented by Peck, Hanson, and Thornburn (Foundation Engineering, Second Edition, 1974, pages 298-299). These slope stability analyses used conservative values for soil shear strength and indicated factors of safety consistently greater than 1.5, which is the minimum recommended value. The slope stability calculations are included in Appendix C of this report.

HYDROLOGY AND HYDRAULICS

Our studies indicate that the ash disposal area occupies a surface area of approximately 37 acres. Of this total surface area, about 26 acres are in Area A (see Figure 1). Areas B and C occupy approximately 3 acres and 8 acres, respectively. The embankments which confine Areas B and C are at or above elevation 565. This is approximately 10 ft higher than the west and north embankments of Area A. The east side of Area A is confined by natural ground. The natural ground surface slopes upward from the east end of the Area A north embankment (about elevation 555) to the east end of the north embankment confining Area C (about elevation 565). The south limits of Areas A, B, and C are defined by Spaulding Dam, which forms Lake Springfield.

Filter cake sludge material is slurried into Areas B and C from the water treatment plant located to the southwest of the site. A majority of the solids settle in Areas B and C, and the water is decanted into Area A through drop inlet pipes located at the north ends of Areas B and C. Surface water also flows from Areas B and C into Area A through the drop inlets.

Coal combustion ash is slurried into the southwest corner of Area A from nearby Lakeside Power Plant. The ash materials settle out in Area A, and the water is decanted into the clarifier pond through a 21 in. diameter drop inlet pipe. The outlet of this pipe is submerged beneath the surface of the clarifier pond. The level of the clarifier pond was at approximately elevation 547 at the time of our site visit. The clarifier pond level is controlled by stop logs in the concrete outlet structure. Flows pass over the stop logs and then discharge into Sugar Creek.

The proposed modifications include raising the embankment surrounding Area A to approximately elevation 565, a maximum height of about 10 ft. This will extend the total height of the west and north embankments to about 28 ft.

This will also increase the storage capacity of Area A by about 260 acre-ft.

According to criteria established by the Illinois Department of Transportation, Division of Water Resources, an impoundment such as this is in the small size classification and in the Class III hazard classification. Such a structure is required to pass or contain the runoff from the 100 year rainfall event with adequate freeboard. With essentially no watershed area, the spillway would be expected to pass only the rain which falls directly on the disposal area (8.4 in. for the 100 year event). Our calculations indicate that the amount of water generated by this event (approximately 25.9 acre-ft) can be discharged from the ash disposal area into the clarifier pond in less than two days.

We propose that the crest of the new inlet structure be established at a maximum elevation of 564, which is 1 ft below the proposed embankment crest. If an emergency situation necessitates lowering the ash disposal area pool, we recommend that this be accomplished with filtered sumps and pumps or siphons discharging into the clarifier pond.

Our hydrology and hydraulic calculations are included in Appendix C of this report.

CONCLUSIONS AND RECOMMENDATIONS

The results of the investigation indicate that the proposed embankment modifications are feasible from a technical standpoint. The slope stability analyses indicate that an adequate factor of safety will exist for the proposed embankment section. Information obtained from Boring 4 indicates that construction of a compacted cohesive embankment is possible over ponded fly ash and bottom ash materials. A copy of the completed construction permit Joint Application Form is included in Appendix D.

We recommend that before construction of the proposed embankment is started the existing vegetation (cattails) should be removed from the embankment area. This may be accomplished by excavating the vegetation with a backhoe or dragline, or by displacing the vegetation (and underlying fly ash) with bottom ash material as it is placed upstream of the crest to provide a stable base for construction of the embankment. Lowering of the water level in the ash disposal area may be necessary until a stable base is provided and the compacted embankment is brought above the elevation of the existing embankment. A trial and error construction approach may be necessary to find the most effective means of providing a stable construction base.

After a stable base is prepared, the cohesive embankment material should be placed in thin lifts (approximately 6 in. to 8 in. thick). The Standard Specifications for Road and Bridge Construction, adopted October 1, 1983, by Illinois Department of Transportation, should be followed for embankment construction (Section 207).

In addition to the proposed new construction, several maintenance items are proposed for the existing embankment. The trees and shrubs should be removed from the embankment faces. The downstream face of the west embankment should be dressed-up so that mowing operations can be performed. This

includes repairing the minor slide area, the erosion gully, and any other areas (such as animal holes) which may obstruct mowing operations. The low, swampy areas should be sloped to drain.

The concentrated seep area should be investigated further to verify that the source of the seepage is an 8 in. diameter toe drain outlet pipe. If found, this outlet pipe should be carried farther away from the embankment toe. A headwall should be provided for the pipe so that it can be protected from mowing operations, and so that it is better identified as a drain outlet.

Although not deemed necessary for stability purposes, consideration should be given to flattening the downstream slope of the north embankment. This would be helpful for future ease of maintenance of this slope.

A Maintenance Plan for the ash disposal area embankment is included in Appendix E.